CLAIMS

1. Process for producing a fuel cell stack with the following steps:

a) stacking the fuel cells into a stack (1), and

b) joining the fuel cell stack (1) as the assembled fuel cell stack (1) is heated and compressed,

characterized in that compression of the assembled fuel cell stack encompasses application of at least one controlled force component (F) to the assembled fuel cell stack (1).

2. Process as claimed in claim 1, wherein the control of at least one force component (F) includes the bracing of the assembled fuel cell stack (1) which has been detected by way of at least one force sensor (8.4).

3. Process as claimed in claim 1 or 2, wherein the control of at least one force component (F) includes the change of the dimensions of the assembled fuel cell stack (1) which has been detected by way of at least one distance sensor (8.5).

4. Process as claimed in one of the preceding claims, wherein at least one controlled force component is produced by a compression and/or tension means (8.1) and is transmitted preferably by way of at least one tie rod (1.4) to the assembled fuel cell stack (1).

5. Process as claimed in claim 4, wherein at least one tie rod (8.1) extends through the recess (1.5) provided in the assembled fuel cell stack (1).

6. Process as claimed in one of the preceding claims, wherein it furthermore comprises the following step which is carried out during and/or after the step b):

c) checking the already at least partially joined fuel cell stack (1) for gastightness.

7. Process as claimed in claim 6, wherein step c) comprises the fact that the fuel cell stack (1) is flooded with a gas, preferably with an inert test gas, and that possible leaks of the fuel cell stack (1) are detected by way of a drop in gas pressure.

8. Process as claimed in claim 7, wherein in the case of detected leakage of the fuel cell stack (1) the fuel cell stack (1) is further heated and/or the fuel cell stack (1) is further compressed.

9. Process as claimed in one of the preceding claims, wherein it furthermore comprises the following step which is carried out during and/or after step b) and preferably during and/or after step c):

d) chemical forming of the fuel cells (1.3) of the fuel cell stack (1) by adding a reducing gas, especially a reducing gas mixture such as hydrogen and nitrogen, to the fuel cells (1.3) of the fuel cell stack (1).

10. Process as claimed in claim 9, wherein the change in the volume of the fuel cell stack (1) caused by step d) is at least partially balanced by corresponding compression of the fuel cell stack (1).

11. Process as claimed in claim 9 or 10, wherein it furthermore comprises the following step which is carried out after step d):

e) testing of the electrical serviceability of the fuel cell stack (1).

12. Process as claimed in claim 11, wherein execution of step e) comprises the fact that the anode side of the fuel cell stack (1) is supplied with a combustible gas and the cathode side of the fuel cell stack (1) is supplied with a cathode gas, and that the voltage which forms in the fuel cell stack (1) and/or a current which can be taken from the fuel cell stack is/are measured.

13. Process as claimed in claim 4, wherein it furthermore comprises the following step:

f) connecting at least one tie rod (1.4) to at least one locking element (1.6) which at least roughly maintains the bracing of the fuel cell stack (1) even when at least one tie rod (1.4) is loosened from the compression and/or tension means (8.1).

14. Process as claimed in one of the preceding claims, wherein at least steps b) and d), but preferably at least steps b), c), d) and e) are carried out in a gastight process chamber (1), preferably without opening the process chamber (11) in the interim.

15. Device for producing a fuel cell stack (1), especially a device for executing the process as claimed in one of claims 1 to 14, with a heating means (3) for heating an assembled fuel cell stack (1) and a means (8) for compressing the assembled fuel cell stack (1), wherein the means (8) for compression of the assembled fuel cell stack (1) comprises a compression and/or tension means (8.1) which is suited to applying at least one controlled force component (F) to the assembled fuel cell stack (1).

16. Device as claimed in claim 15, wherein a control means (8.6) is assigned to the compression and/or tension means (8.1) for controlling at least one force component (F) and it controls at least one force component (F) depending on the bracing of the assembled fuel cell stack (1) which has been detected by way of at least one force sensor (8.4) and/or as a function of the change of the dimension of the assembled fuel cell stack (1) which is detected by way of at least one distance sensor (8.5).

17. Device as claimed in claim 16, wherein the compression and/or tension means (8.1) is suited to applying at least one controlled force component (F) to the assembled fuel cell stack (1) by way of a tie rod (1.4).

18. Device as claimed in one of claims 15 to 17, wherein it has a gastight process chamber (11) which is provided for holding the assembled fuel cell stack (1) and a gas supply means (7,9)

which is intended for flooding the process chamber (11) and/or the fuel cell stack (1) which is located in the process chamber with gas.

19. Device as claimed in claim 18, wherein it has a gas exhaust means (10).

20. Device as claimed in one of claims 15 to 19, wherein it has an electrical test means (6).

21. Device as claimed in one of claims 18 to 20, wherein it has a plurality of movable gastight process chambers (11) which are designed to be moved to different treatment stations for executing individual fuel cell stack production steps.

22. Device as claimed in claim 21, wherein the plurality of gastight process chambers (11) are arranged in the form of a carousel.